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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,541	07/20/2004	Chun-Ming Cho	REAP0132USA	4540

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EXAMINER	
SINGH, HIRDEPAL	

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
12/21/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/710,541	CHO ET AL.	
	Examiner	Art Unit	
	Hirdepal Singh	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/31/2007, 11/22/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the amendment filed on October 25, 2007.

Response to Arguments

2. The amendment addressed and corrected the informalities in the drawings. Therefore, the objection to the drawings is withdrawn.

3. The amendment corrected the informalities in the specification. Therefore, the objection to the drawings is withdrawn.

4. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 5-6, 8, 10-12, 14-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (US 2005/0152317) in view of Gummadi et al. (US 7,136,436) further in view of Chow et al. (US 2005/0276340).

Regarding Claims 1, and 10:

Awater discloses an apparatus of detecting interference of a symbol for adjusting a boundary of the symbol utilized by an OFDM system (abstract; paragraph 0054), the apparatus comprising:

a first correlator (405 in figure 7 through DC sub a1(n)) for computing a first correlation value representing the correlation between at least one of first signals of a first symbol and at least one of second signals of a second symbol (figures 5 and 7 ; paragraphs 0037, 0061 and 0062), wherein the at least one first signal is transmitted via a first sub-carrier and the at least one second signal is transmitted via a second sub-carrier (figure 9a; paragraph 0084 where the different samples are sent using different sub carriers) adjacent to the first sub-carriers;

a second correlator (405 in figure 7 through DC sub a2(n)) for computing a second correlation value representing the correlation between the at least one first signal and at least one of third signals of a third symbol (paragraphs 0040, and 0046-0047) (as clearly stated in claim number 6) next to the first symbol, wherein the at least one first signal is transmitted via the first sub-carrier and the at least one third signal is transmitted via the second sub-carrier;

a comparator (320 and 416 in figures 5 and 7) for comparing the first correlation value with the second correlation value ("the first correlation value for 10 or 12 symbols is coming through the top path i.e. block 312(1) and as input s1, second correlation value is coming through the bottom path" ; paragraphs 0056, 63).

Awater discloses all of the subject matter as described above except for specifically teaching that (1) the second symbol is previous to the first symbol, third symbol is placed next to the first symbol (not previous to first symbol) for calculating second correlation value; (2) the at least one second signal is transmitted via a second sub-carrier adjacent to the first sub-carrier; and (3) a timing controller for adjusting the timing of the boundary according to the comparison result.

However, Regarding item (1) above Gummadi in the same field of endeavor, discloses a similar apparatus and method for boundary detection using multiple correlations, where the received signal is correlate with previous signal and both are transmitted through same channel (column 5, lines 58-67), also the system could be using a multi-carrier or single-carrier technique (column 9, lines 55-65), the correlation value is generated by comparing samples in a period with samples in another/different period (column 6, lines 22-28), furthermore the correlation value is generated by comparison of samples of a period with samples in another adjacent period (abstract; column 6, lines 56-67 "adjacent means previous or after"), and a control signal to control the functions of the system (figure 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to generate correlations of adjacent symbols as taught by Gummadi in

the Awater system in order to take advantage of transmission efficiencies by modeling plurality of sub-carriers closely spaced in frequency and modulated by a unique frequency offset value as they are orthogonal thus the interference is negated at the receiver. Also to generate a correlation value by comparing adjacent period samples i.e. a period previous to first one or by comparing a period next to first one in order to see the presence of sequence boundary more rapidly and to make more reliable interference rejection.

However, Regarding items (2) and (3) above Chow in the same field of endeavor, discloses a similar apparatus and method for boundary detection where plurality of correlation values are detected based on the symbols transmitted over plurality of sub carriers (figure 5; paragraphs 0020, 0023, 0031 and 0074) this in inherent that the sub-carries are placed adjacent to each other for transmitting the signals i.e. second sub-carrier is adjacent to the first sub-carrier; and further discloses that detecting a timing for adjusting the timing of the boundary according to the comparison result (paragraph 0017 "it is known previously in the art to adjust the boundary according to the correlation results to get the synchronization").

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit the symbols over plurality of sub-carriers adjacent to each other i.e. second sub-carrier is adjacent to the first sub-carrier and adjust the timing of the boundary according to the correlation results in order to get better performance and to get the synchronization based on the generated correlation value by comparing adjacent period samples to get the offset estimation correctly.

Regarding Claims 2, and 11:

Awater discloses all of the subject matter as described above, except for specifically teaching that the signals include a plurality of pilot and data signals.

However, Gummadi in the same field of endeavor discloses that the signal packets could be data signals and control signal i.e. pilot signals (column 1, lines 15-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit symbols including plurality of pilot signals and data signals in Awater. One would have been motivated to include plurality of pilot signal and plurality of data signals in the symbols in order to get the real data send with the related control or reference information as well.

Regarding Claims 3, and 12:

Awater discloses all of the subject matter as described above, and further discloses that the first correlator comprises;

a conjugating unit for computing the conjugating value of first data (figures 5, and 7; paragraph 0047);

multiplying unit for multiplying conjugated data with second data for generating product value (figures 5, and 7; paragraph 0047);

correlation value computer generating correlation value according to product value i.e. an adder (figures 5, and 7; paragraph 0047).

Regarding Claims 5, and 14:

Awater discloses all of the subject matter as described above, and further discloses that the correlation value is calculated based on square of the absolute value and then the squared values are added in a summation unit (paragraphs 0037, and 0056).

Regarding Claims 6, and 15:

Awater discloses all of the subject matter as described above, and further discloses that the second correlator used for generating second correlation value comprises;

a conjugating unit for computing the conjugating value of first data (figures 5, and 7; paragraph 0047);

multiplying unit for multiplying conjugated data with the adjacent data(third data) for generating product value (figures 5, and 7; paragraph 0047);

correlation value computer generating correlation value according to product value i.e. an adder (figures 5, and 7; paragraph 0047).

Regarding Claims 8, and 17:

Awater discloses all of the subject matter as described above, and further discloses that the correlation value is calculated based on square of the absolute value

and then the squared values are added in a summation unit (paragraphs 0037, and 0056).

7. Claims 4, 7, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (US 2005/0152317) in view of Gummadi et al. (US 7,136,436) further in view of Chow et al. (US 2005/0276340) as applied to claims 1, 3, 6, 10-12 and 15 above and further in view of Narasimhan (US 7,218,691).

Regarding Claims 4, and 13:

Awater discloses all of the subject matter as described above, and further discloses that the correlation value calculation includes a summation unit or an adder (figures 5, and 7; paragraph 0047), except for specifically teaching that the correlation is based on the absolute value of the product.

However, Narasimhan in same field of endeavor discloses a similar method and apparatus for estimating the timing of OFDM symbol by generating a correlation value with comparison of sum of correlation with a prior and a subsequent value (abstract; figure 8; column 2, lines 48-54), and further discloses that the correlation value is generated based on the sum of absolute values (column 2, lines 35-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use and absolute value calculating unit as taught by Narasimhan in Awater system to generate the correlation value in order to quantize the sign bits of the received signal.

Regarding Claims 7, and 16:

Awater discloses all of the subject matter as described above and further discloses that the correlation value calculation includes a summation unit or an adder (figures 5, and 7; paragraph 0047), except for specifically teaching that the correlation is based on the absolute value of the product.

However, Narasimhan in same field of endeavor discloses a similar method and apparatus for estimating the timing of OFDM symbol by generating a correlation value with comparison of sum of correlation with a prior and a subsequent value (abstract; figure 8; column 2, lines 48-54), and further discloses that the correlation value is generated based on the sum of absolute values (column 2, lines 35-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use and absolute value calculating unit as taught by Narasimhan in Awater system to generate the correlation value in order to quantize the sign bits of the received signal.

8. Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (US 2005/0152317) in view of Gummadi et al. (US 7,136,436) further in view of Chow et al. (US 2005/0276340) as applied to claims 1 and 10 above, and further in view of Mui (US 6,690,739).

Regarding Claims 9, and 18:

Awater discloses all of the subject matter as described above except for specifically teaching, using an equalizer and a slicer for equalizing and then slicing the second symbol.

However, Mui in the same field of endeavor discloses a similar method and system for interference compensation, and further discloses using an equalizer and a slicer in the inter symbol interference compensation decoder (figure 18; column 31, lines 18-57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the equalizer and the slicer in Awater to equalize the second symbol and then slicing the symbol to generate a signal in order to cancel the intercarrier or multipath interferences in the signal. Similarly, one of ordinary skill in the art would use an equalizer and a slicer for the third symbol to generate third signal.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hirdepal Singh whose telephone number is 571-270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off)8:00AM-5:00PMEST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HS
December 17, 2007

SHUWANG LIU
SUPERVISORY PATENT EXAMINER